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Habitat Selection, Diversity and Estimating the Species Richness of Rotifers in Two Ponds Located in Central Anatolia

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Abstract: Sample collections from aquatic ecosystems in many studies are limited to few habitats. This study is carried out to determine habitat selection, diversity and estimating the species richness of rotifers in samples collected from diverse habitats such as benthic, phytoplanktons, macrophytes, plankton, submerged moss and *Gammarus* sp. in two ponds located in Central Anatolia. A total of 68 species were recorded from 32 samples (20 from Soysalli pond and 12 from Ovaciftlik pond). Overall species richness (gamma diversity) was observed as 52 and estimated species richness was 64 for Soysalli pond. Overall species richness was observed as 42 and estimated species richness is 51 for Ovaciftlik pond. Richness for each sample (alpha diversity) was 3.9 for Soysalli pond while an alpha diversity of 5.5 was recorded for Ovaciftlik pond. All recorded species in this study are widely distributed worldwide however 3 of them: *Dissotrocha hertzogi*, *Macrotrochela concinca* and *Ptygura furcillata* are new records for Turkey.

Key words: Substrat selection, alpha diversity, beta diversity, gamma diversity, species estimation, rotifera

INTRODUCTION

Rotifers have complex diversity and distributions in freshwater because many species are cosmopolitan and endemicity is very low. There is no latitudinal diversity pattern. While diversity is highest in the tropics, a high endemicity rate has been observed in tropical South America and Australia (Segers, 2008).

Although, planktonic samples are of great interest to scientists (Sharma and Sharma, 2001; Duggan *et al*., 2002; Kaya and Altindag, 2007) these samples are not representative of the rotifer species richness in aquatic environments because many species live in specific habitats.

Some studies were performed to show habitat selection of sessile and psammic rotifers (Wallace, 1980; Tzschaschel, 1983; Francez, 1984). Finally, comprehensive studies were performed to explain of habitat selection of rotifers collected samples in southern and central Sweden between 1945 and1982 (Pejler and Berzins, 1989, 1993a-f, 1994).

Since these studies, no specific attempt has been made to explain habitat choice of rotifers in aquatic environments. Diversity of bdelloid rotifers (alpha, beta and gamma diversity) and estimating species richness in terrestrial habitats have been examined (Fontaneto *et al*., 2006; Fontaneto and Ricci, 2006; Kaya *et al*., 2009) and species richness per sample (alpha diversity) was found from 1-11 but it was lower in high altitudes. Similarity between samples (beta diversity) and global richness (gamma diversity) of rotifers in aquatic ecosystems have been examined (Muirhead *et al*., 2006; Walsh *et al*., 2007) but richness for each sample (alpha diversity) of rotifers in aquatic environments has not been examined yet. Estimating rotifer species richness was analyzed by Dumont and Segers (1996) in North America, South America, Europe and Africa.

These analyses showed that temperate lakes should contain between 150-160 rotifer species although tropical lakes should contain in excess of 210 species. A recent study was carried out to estimate species richness of three lakes by collecting samples from three different habitats such as pelagic, psammon and littoral in Poland by Muirhead *et al*. (2006).

In the study by Muirhead *et al*. (2006), two estimating analyses (Chao2 estimate and Jackknife2 estimator) were used to estimate species richness of these lakes. The estimates were found slightly different. An estimation of the species richness of the ponds was made by collecting samples from 32 habitats in the present study. Rotifers

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about 2030 known species worldwide (Segers, 2007), live in diverse habitats including pelagic, macrophytes, benthic and submerged mosses in aquatic ecosystems (Pejler, 1995).

These small animals select habitat based on factors like temperature, oxygen content, trophic degree, chemical environment, food choice and sensitivity to predation (Pejler and Berzins, 1989).

Recently many new record rotifers have been discovered in Turkey (Kaya *et al*., 2008; Altindag *et al*., 2009; Kaya and Altindag, 2009).

Three new records are given in the present study so the number of Turkish rotifers has increased from 286-289. The first aim of the present study is to contribute to knowledge of habitat selection by rotifers in aquatic ecosystems. The second is to explain diversity (species richness for each sample, % of similarity between samples, richness of each pond) and estimate the species richness of rotifers in aquatic ecosystems using two ponds located in the Central Anatolia as test cases.

MATERIALS AND METHODS

Study area: The Soysalli and Ovaciftlik ponds are located between the Develi and Yahyali plains in Central Anatolia (Kayseri, Turkey) (Fig.1). The distance between these ponds is about 5 km. The depths of the ponds are <1 m.

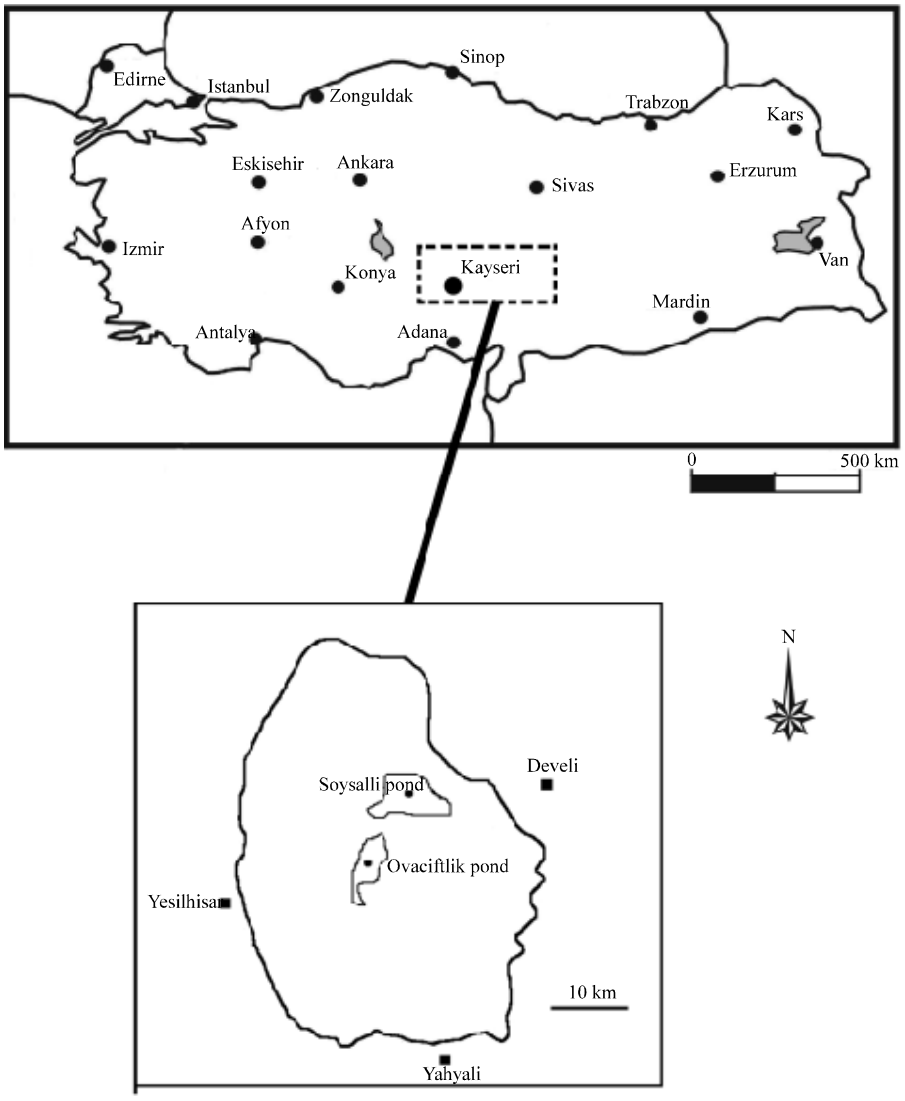

Fig. 1: Map of sampling localities

Table 1:Species list of rotifers collected samples from different habitats in two ponds located in Central Anatolia

	**Alisma plantago -aquatica L.	●Benthic (clay soil)	●Benthic (mud)	**Benthic (mud)	●Benthic (soil)	●Benthic vegetation	●Carex acuta L.	**Cladophora glomerata L.	**Phragmites australis (Cav.) trin. ex steud.	●Gammarus sp.	●Grass
Anuraeopsis fissa	-	-	-	-	-	-	-	-	-	-	-
Ascomorpha ecaudis	-	-	-	-	-	-	-	-	-	-	-
Asplanchna brightwelli	-	-	-	-	-	-	-	-	-	-	-
Asplanchna priodonta	-	-	-	-	-	-	-	-	-	-	-
Brachionus calyciflorus	-	-	-	-	-	-	-	-	-	-	-
Brachionus quadridentatus	-	-	-	-	-	-	-	-	-	-	-
Cephalodella catellina	X	-	-	-	-	-	-	X	-	-	-
Cephalodella fluviatilis	X	-	-	-	-	-	-	-	-	-	-
Cephalodella forficula	-	-	-	-	-	-	-	-	-	-	-
Cephalodella gibba	-	-	-	-	-	-	-	-	-	-	-
Cephalodella gracilis	X	-	-	-	-	-	-	-	-	-	-
Cephalodella intuta	-	-	-	-	-	-	-	-	-	-	-
Cephalodella ventripes	X	-	-	-	-	-	-	-	-	-	-
Colurella adriatica	X	-	-	-	-	-	-	-	-	-	-
Colurella colurus	X	-	-	-	-	-	-	-	-	-	-
Colurella obtusa	-	-	-	-	-	-	-	-	-	-	-
Colurella uncinata	-	-	-	-	-	-	-	-	-	-	-
Conochilus unicornis	-	-	-	-	-	-	-	-	-	-	-
**Dissotrocha hertzogi*	-	-	-	-	-	-	-	-	-	-	-
Embata laticeps	-	-	-	-	-	-	-	-	-	X	-
Euchlanis dilatata	-	-	-	-	-	-	-	-	-	-	-
Euchlanis incisa	-	-	-	-	-	-	-	-	-	-	-
Hexarthra fennica	-	-	-	-	-	-	-	-	-	-	-
Itura aurita	-	-	-	-	-	-	X	-	-	-	-
Keratella cochlearis	-	-	-	-	-	-	-	-	-	-	-
Keratella tropica	-	-	-	-	-	-	-	-	-	-	-
Lecane bulla	-	-	-	-	-	-	-	-	-	-	X
Lecane closterocerca	-	-	-	-	-	-	X	X	-	-	-
Lecane flexilis	-	-	-	-	-	-	-	-	-	-	-
Lecane luna	-	-	-	-	-	-	-	-	-	-	-
Lecane lunaris	X	-	-	-	-	-	-	-	-	-	-
Lecane nana	-	-	-	-	-	-	-	-	-	-	-
Lecane tenuiseta	-	-	-	-	-	-	X	-	-	-	-
Lepadella acuminata	-	-	-	-	-	-	-	-	-	-	X
Lepadella ovalis	-	-	-	-	-	-	-	-	-	-	-
Lepadella patella	-	-	-	-	-	X	X	-	-	-	-
Lepadella quadricarinata	X	-	-	-	-	X	-	-	-	-	-
Lophocharis salphina	-	-	-	-	-	-	X	X	-	-	-
**Macrotrochela concinca*	-	-	-	-	-	-	-	-	-	-	-
Mytilina mucronata	-	-	-	-	-	-	-	-	-	-	-
Mytilina ventralis	-	-	-	-	-	-	-	-	-	-	-
Notommata crytopus	-	-	-	-	-	-	-	-	-	-	-
Notommata glyphura	-	-	-	-	-	-	-	-	-		-
Philodina citrina	-	-	-	-	-	-	-	X	-	-	-
Platyias quadricornis	-	-	-	-	-	-	-	-	-	-	-
Pleuretrocha petromyzon	-	-	-	-	-	-	X	-	-	-	-
Polyarthra dolichoptera	-	-	-	-	-	-	-	-	-	-	-
Polyarthra remata	-	-	-	-	-	-	-	-	-	-	-
Pompholyx sulcata	-	-	-	-	-	-	-	-	-	-	-
Proales fallaciosa	-	-	-	-	-	-		-	-	-	-
Proales theodora	-	-	-	-	-	-	-	-	-	-	-
**Ptygura furcillata*	-	-	-	-	-	-	-	-	-	-	-
Rotaria neptunia	-	-	-	-	-	-	-	-	-	-	-
Rotaria rotatoria	-	-	-	-	-	X	-	X	-	-	-
Rotaria tardigrada	-	-	-	-	-	-	-	X	X	-	-
Synchaeta oblonga	-	-	-	-	-	-	-	-	-	-	-
Synchaeta pectinata	-	-	-	-	-	-	-	-	-	-	-
Testudinella patina	-	-	-	-	-	-	-	-	-	-	-
Trichocerca bidens	-	-	-	-	-	-	-	-	-	-	-
Trichocerca longiseta	-	-	-	-	-	-	-	X	-	-	-
Trichocerca porcellus	-	-	-	-	-	-	-	-	-	-	-
Trichocerca pusilla	X	-	-	-	-	-	-	-	-	-	-
Trichocerca relicta	-	-	-	-	-	-	-	-	-	-	-
Trichocerca similis	-	-	-	-	-	-	-	-	-	-	-
Trichocerca tenuior	-	-	-	-	-	-	-	-	-	-	-
Trichocerca weberi	-	-	-	-	-	-	-	-	-	-	-
Trichotria pocillum	-	-	-	-	-	-	-	X	-	-	-
Trichotria tetractis	-	-	-	-	-	-	-	-	-	-	X

Table 1: Continued

	●*Groenlandia densa* (L.) Fourr	●*Hydrodictyon reticulata* (L.) Lagerh.	●*Lemna gibba* L.	●*Mentha-longifolia* (L.) Hudson	●*Myriop-hyllum spicatum* L.	** Myriop-hyllum *verticillatum* L.	**Nymphoides *peltata* S.G. (Gmelin)	●Plan kton1	Plan kton2	Polygonum amphi-bium L.	Potamo-geton crispus L.
Anuraeopsis fissa	-	-	-	-	-	-	-	X	-	-	-
Ascomorpha ecaudis	-	-	-	-	-	-	-	X	X	-	-
Asplanchna brightwelli	-	-	-	-	-	-	-	-	X	-	-
Asplanchna priodonta	-	-	-	-	-	-	-	-	X	-	-
Brachionus calyciflorus	-	-	-	-	-	-	-	X	X	-	-
Brachionus quadridentatus	-	-	-	-	-	-	-	X	-	-	-
Cephalodella catellina	-	-	-	-	-	-	-	-	X	-	-
Cephalodella fluviatilis	-	-	-	-	-	-	-	-	-	-	-
Cephalodella forficula	-	X	-	-	-	-	-	-	-	-	-
Cephalodella gibba	-	-	-	-	X	-	-	-	X	-	-
Cephalodella gracilis	-	-	-	-	-	-	-	-	-	-	-
Cephalodella intuta	-	X	-	-	-	-	X	-	-	X	-
Cephalodella ventripes	-	-	-	-	-	-	X	-	-	-	-
Colurella adriatica	-	X	-	-	X	-	X	-	-	-	-
Colurella colurus	X	-	-	-	-	-	X	-	-	-	-
Colurella obtusa	-	-	-	-	-	-	X	-	-	X	-
Colurella uncinata	-	-	-	-	-	-	-	-	X	-	-
Conochilus unicornis	X	-	-	-	-	-	-	-	-	-	-
**Dissotrocha hertzogi*	-	-	-	-	-	-	-	-	-	X	-
Embata laticeps	-	-	-	-	-	-	-	-	-	-	-
Euchlanis dilatata	-	-	X	-	-	-	-	-	X	-	-
Euchlanis incisa	-	-	X	-	-	-	-	-	X	-	-
Hexarthra fennica	-	-	-	-	-	-	-	-	X	-	-
Itura aurita	-	-	-	-	-	-	X	-	X	-	-
Keratella cochlearis	-	-	-	-	-	-	-	X	-	-	-
Keratella tropica	-	-	-	-	-	-	-	-	X	-	-
Lecane bulla	-	-	-	-	-	-	-	-	-	-	-
Lecane closterocerca	-	X	X	-	-	-	X	-	X	X	-
Lecane flexilis	-	-	-	-	-	-	-	-	-	-	-
Lecane luna	-	X	-	-	-	-	-	-	-	-	-
Lecane lunaris	-	-	-	X	-	-	-	-	-	-	-
Lecane nana	-	-	X	-	-	-	X	-	-	-	-
Lecane tenuiseta	-	-	-	-	-	-	-	-	-	-	-
Lepadella acuminata	-	-	-	-	-	-	-	-	-	-	-
Lepadella ovalis	-	-	-	-	-	-	-	-	-	X	-
Lepadella patella	-	X	-	-	-	-	-	-	-	-	-
Lepadella quadricarinata	-	X	-	-	-	-	-	-	-	-	-
Lophocharis salphina	-	-	-	-	-	-	-	-	-	-	-
**Macrotrochela concinca*	-	-	-	-	-	-	-	-	-	-	-
Mytilina mucronata	-	-	X	-	-	-	-	-	-	X	-
Mytilina ventralis	-	-	-	-	-	-	-	X	-	-	-
Notommata crytopus	-	-	-	-	-	-	-	-	-	-	-
Notommata glyphura	-	-	-	-	-	-	-	X	-	-	-
Philodina citrina	X	-	X	X	X	-	-	-	-	-	X
Platyias quadricornis	-	-	-	-	-	-	-	X	-	X	-
Pleuretrocha petromyzon	-	-	-	-	-	-	-	-	-	-	-
Polyarthra dolichoptera	-	-	-	-	-	-	-	-	X	-	-
Polyarthra remata	-	-	-	-	-	-	-	-	X	-	-
Pompholyx sulcata	-	-	-	-	-	-	-	X	X	-	-
Proales fallaciosa	-	-	-	-	-	-	-	-	-	-	-
Proales theodora	-	-	-	-	-	-	-	-	-	-	-
**Ptygura furcillata*	-	-	-	-	-	-	-	-	-	X	-
Rotaria neptunia	-	-	-	-	-	-	-	-	-	-	-
Rotaria rotatoria	-	-	-	X	-	-	-	X	X	X	-
Rotaria tardigrada	-	-	-	-	-	X	-	-	-	-	-
Synchaeta oblonga	-	-	-	-	-	-	-	-	X	-	-
Synchaeta pectinata	-	-	-	-	-	-	-	X	X	-	-
Testudinella patina	-	-	-	-	-	-	-	-	-	X	-
Trichocerca bidens	-	-	-	-	-	-	-	-	-	-	-
Trichocerca longiseta	-	-	-	-	-	-	-	-	-	-	-
Trichocerca porcellus	-	-	-	-	-	-	-	-	-	-	-
Trichocerca pusilla	-	-	-	-	-	-	-	-	-	-	-
Trichocerca relicta	-	-	-	-	-	-	-	-	-	-	-
Trichocerca similis	-	-	-	-	-	-	-	X	-	-	-
Trichocerca tenuior	-	-	-	-	-	-	-	-	-	-	-
Trichocerca weberi	-	-	-	-	-	-	-	-	-	-	-
Trichotria pocillum	-	-	-	-	-	-	-	-	-	-	-
Trichotria tetractis	-	-	-	-	-	-	-	-	-	-	-

Table 1: Continued

	● *Ranunculus trichophyllus* Chaix	●*Salix alba* (leaf)	● *Salix alba* (stem)	** *Schoenoplectus lacustris*	●*Spirogyra fluviatilis* Hilse	** *Sparganium erectum* L.	●Submerged moss1	●Submerged moss2	**Submerged moss3	** *Typha latifolia* L.
Anuraeopsis fissa	-	-	-	-	-	-	-	-	-	-
Ascomorpha ecaudis	-	-	-	-	-	-	-	-	-	-
Asplanchna brightwelli	-	-	-	-	-	-	-	-	-	-
Asplanchna priodonta	-	-	-	-	-	-	-	-	-	-
Brachionus calyciflorus	-	-	-	-	-	-	-	-	-	-
Brachionus quadridentatus	-	-	-	-	-	-	-	-	-	
Cephalodella catellina	-	-	-	-	-	-	-	-	-	-
Cephalodella fluviatilis	-	-	-	-	-	-	-	-	-	X
Cephalodella forficula	-	-	-	-	-	-	-	-	-	-
Cephalodella gibba	X	-	X	-	-	-	-	-	-	X
Cephalodella gracilis	-	-	-	-	-	-	-	-	-	-
Cephalodella intuta	-	-	-	-	-	-	-	-	-	-
Cephalodella ventripes	-	-	-	-	-	-	-	-	-	X
Colurella adriatica	-	-	-	-	-	-	-	-	-	X
Colurella colurus	-	-	-	-	-	-	-	-	X	-
Colurella obtusa	-	-	-	X	-	-	-	-	-	-
Colurella uncinata	-	-	-	-	-	-	-	-	-	-
Conochilus unicornis	-	-	-	-	-	-	-	-	-	-
**Dissotrocha hertzogi*	-	-	-	-	-	-	-	-	-	-
Embata laticeps	-	-	-	-	-	-	-	-	-	-
Euchlanis dilatata	-	-	-	-	-	-	-	-	X	-
Euchlanis incisa	-	-	-	-	-	-	-	-	X	-
Hexarthra fennica	-	-	-	-	-	-	-	-	-	-
Itura aurita	-	-	-	-	-	-	-	-	-	-
Keratella cochlearis	-	-	-	-	-	-	-	-	-	-
Keratella tropica	-	-	-	-	-	-	-	-	-	-
Lecane bulla	-	-	-	-	-	-	-	-	-	-
Lecane closterocerca	-	X	-	-	-	X	-	X	X	-
Lecane flexilis	-	X	-	-	-	-	-	-	-	-
Lecane luna	-	X	-	-	-	-	-	-	X	-
Lecane lunaris	-	X	-	-	X	-	-	-	-	-
Lecane nana	-	-	-	-	-	-	-	-	-	-
Lecane tenuiseta	-	-	-	-	-	-	-	-	-	-
Lepadella acuminata	-	-	-	-	-	-	-	-	-	-
Lepadella ovalis	-	-	-	-	-	-	-	-	-	-
Lepadella patella	-	-	-	-	-	-	X	-	X	-
Lepadella quadricarinata	-	-	-	-	-	-	-	-	X	-
Lophocharis salphina	-	-	-	-	-	-	-	-	-	-
**Macrotrochela concinca*	-	-	-	-	-	X	-	-	-	-
Mytilina mucronata	-	-	-	-	-	-	-	-	-	-
Mytilina ventralis	-	-	-	-	-	-	-	-	X	-
Notommata crytopus	-	-	-	-	-	-	-	-	-	-
Notommata glyphura	-	-	-	-	-	-	-	-	-	-
Philodina citrina	-	-	X	-	-	-	-	-	X	-
Platyias quadricornis	-	-	-	-	-	-	-	-	-	-
Pleuretrocha petromyzon	-	-	-	-	-	-	-	-	-	-
Polyarthra dolichoptera	-	-	-	-	-	-	-	-	-	-
Polyarthra remata	-	-	-	-	-	-	-	-	-	-
Pompholyx sulcata	-	-	-	-	-	-	-	-	-	-
Proales fallaciosa	-	X	-	-	-	-	-	-	-	-
Proales theodora	-	-	-	-	-	-	-	X	-	-
**Ptygura furcillata*	-	-	-	-	-	-	-	-	-	-
Rotaria neptunia	-	-	-	-	-	-	X	-	-	-
Rotaria rotatoria	-	-	-	-	-	-	-	X	-	-
Rotaria tardigrada	-	-	-	-	-	-	-	-	-	-
Synchaeta oblonga	-	-	-	-	-	-	-	-	-	-
Synchaeta pectinata	-	-	-	-	-	-	-	-	-	-
Testudinella patina	-	-	-	-	-	-	-	-	-	-
Trichocerca bidens	-	-	-	-	-	-	-	X	X	-
Trichocerca longiseta	-	-	-	-	-	-	-	X	-	-
Trichocerca porcellus	-	-	-	-	-	-	-	-	-	-
Trichocerca pusilla	-	-	-	-	-	-	-	-	-	-
Trichocerca relicta	-	X	-	-	-	-	-	-	-	-
Trichocerca similis	-	-	-	-	-	-	-	-	-	-
Trichocerca tenuior	-	-	-	-	-	-	-	-	-	X
Trichocerca weberi	-	-	-	-	-	-	-	X	-	-
Trichotria pocillum	-	-	-	-	-	-	-	-	-	-
Trichotria tetractis	-	-	-	-	-	-	-	-	-	X

Samples collection: Twenty samples were collected from Soysalli pond on 03.10.2008 and 12 samples were collected from Ovaciftlik pond (Kayseri, Turkey) on 04.10.2008. Fifty specimens were counted for each sample. Pelagic samples were collected using a plankton net (55 μ pore sized). The samples of macrophytes were cut by a knife and put into 500 mL plastic bottles and then distilled water was added to keep the animals alive. For benthic samples, a layer of bottom material (2 cm for each side) was taken and put into 500 mL plastic bottles. Sediment samples were rinsed with distilled water and then filtered through a 15 μ pore plankton net. A few individuals of *Gammarus* sp. were collected and 50 individuals of only one species (*Embata laticeps*) were counted (Table 1).

Species identification: After the field trips, all samples were taken to the laboratory within about 3 h. Living specimens of rotifers were used for species identification under 40 and 100x magnifications following Donner (1965) and Segers (1995). Identification of plants and phytoplankton specimens were made according to John *et al.* (2002) and Secmen and Leblebici (1997).

Analyses: Estimates version 7 (Colwell, 2004) was used to compute species estimating for two ponds. Alpha, beta, gamma diversities and estimate curve were calculated by using excel program.

RESULTS AND DISCUSSION

Habitat selection and diversity of rotifers in two ponds located in Central Anatolia (Turkey) were surveyed. Collecting samples from different habitats increased the number of species richness (gamma diversity) for each pond.

Alpha diversity (species richness for each sample): Species richness of each sample (alpha diversity) was observed to be 3.9 for Soysalli pond while it was found to be 5.5 for Ovaciftlik pond. No species were recorded from the 4 benthic samples (3 from Soysalli pond and 1 from Ovaciftlik pond).

The greatest species richness was found in plankton samples (12 species from Soysalli pond and 19 species from Ovaciftlik pond). Species richness was found to be high in some collected samples: *Polygonum amphibium* and submerged moss from Ovaciftlik pond (10 species); *Alisma plantago-aquatica* (9 species); *Hydrodictyon reticulata*, *Cladophora glomerata* and *Nymphoides peltata* (8 species), *Lemna gibba* (7 species).

Beta diversity (% of similarity between samples): About 27 species out of 68 (40%) were common to both ponds and 16 species (24%) were observed only from plankton samples. Forty species out of 52 in Soysalli pond were

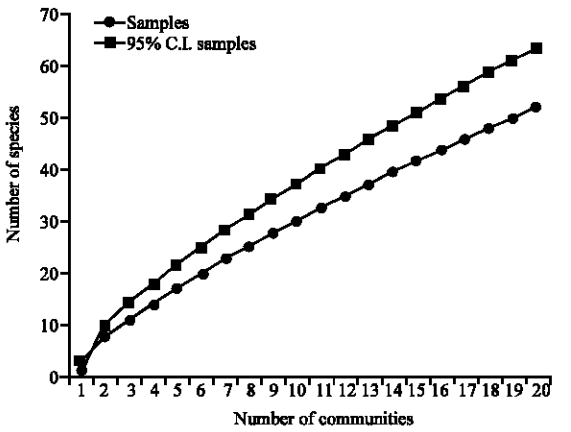

Fig. 2: Observed and estimated species richness of rotifers from Soysalli pond 95% CI, through resampling techniques using estimates 7 (Colwell, 2004)

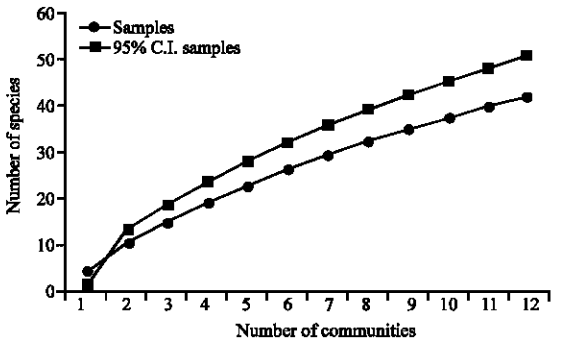

Fig. 3: Observed and estimated species richness of rotifers from Ovaciftlik pond 95% CI, through resampling techniques using estimates 7 (Colwell, 2004)

recorded from only one habitat. In Soysalli pond, *Lecane closterocerca* was found in 7 samples and followed by *Philodina citrina*, *Rotaria rotatoria* in 5 samples and *Lepadella patella* in 4 samples, respectively. About 27 species out of 42 in Ovaciftlik pond were recorded from only one habitat. In Ovaciftlik pond, *Lecane closterocerca* was also found from 5 samples.

Gamma diversity (richness of each pond): A total of 68 species, 52 from Soysalli pond and 42 from Ovaciftlik pond were recorded by collecting samples from 32 habitats such as pelagic, macrophytes, submerged moses, benthic and *Gammarus* sp. According to Chao2 estimates, there are 64 species in Soysalli pond (Fig. 2) and 51 species in Ovaciftlik pond (Fig. 3). All the recorded species are widely distributed around the world (Segers, 2007) however, three species (*Dissotrocha hertzogi*, *Macrotrachela concinca* and *Ptygura furcillata*) are new

records for the Turkish fauna. Species richness for each sample (alpha diversity) of terrestrial habitats (alpha diversity) has been examined recently (Fontaneto and Ricci, 2006; Fontaneto *et al*., 2006; Kaya *et al*., 2009). The number of recorded species for each moss sample in these studies is ranged from 1-6 species at elevations >3.000 m, from 1-11 species in the Alps at elevations <1.800 m, from 3-9 species in Turkey and UK. The range of species richness for each water sample in the present study is from 0-12 in Soysalli pond and from 0-19 in Ovaciftlik pond. This range is very large when compared to other studies carried out in terrestrial habitats. As is known, species richness of planktonic samples is very high. Nineteen species from plankton samples from Ovaciftlik pond and 12 species from plankton samples from Soysalli pond were recorded in contrast, no species were recorded from collected 4 benthic samples. Excluding the benthic and planktonic samples in these ponds, species richness for each sample is ranged from 1-10, 3.9 for Soysalli pond and 4.7 for Ovaciftlik pond. Again excluding the benthic and planktonic samples, the same ranges for each sample are observed in other studies carried out in terrestrial habitats and in the present study carried out in two ponds. Differences between species composition of samples (beta diversity) were observed to be quite high and the same results were found for bdelloid rotifers in other studies carried out in terrestrial habitats (Fontaneto and Ricci, 2006; Fontaneto *et al*., 2006; Kaya *et al*., 2009). *L. closterocerca* was found in 12 samples out of 32. The smallest habitat selection was observed in *L. closterocerca* and also it is one of the most cosmopolitan species in the world (Segers, 1995, 2007). The high differences of species composition in the samples show that rotifers have quite high substrate selection in aquatic and terrestrial habitats.

Results of some studies conducted with seasonally or monthly collected samples from rivers, lakes or reservoirs in Turkey, demonstrate an overall species richness (gamma diversity) ranging from 31-47 (Bekleyen, 2001; Bozkurt *et al*., 2002; Ustaoglu *et al*., 2004). In the present study, 52 species from Soysalli pond (estimates 64 species) and 42 species from Ovaciftlik pond (estimates 51 species) were recorded from only one sampling time. Overall species richness in the present study is quite high compared to other studies carried out in Turkey.

CONCLUSION

The present study supports the idea that overall species richness (gamma diversity) is positively affected by the number of diverse habitats in the sampling ponds because rotifers living in aquatic environments have strong habitat selection like bdelloid rotifers living in terrestrial habitats (Fontaneto *et al*., 2006).

According to the hypothesis everything is everywhere by Baas-Becking (1934), microscopic organisms are globally distributed because of their high dispersal ability, dormancy and small body size (Ricci and Caprioli, 2005; Fenchel and Finlay, 2004). The present study does not support the hypothesis everything is everywhere. Although, these ponds are located in a restricted area (the distance between the ponds is about 5 km), more than half of the all recorded species are not shared between the ponds. Only 27 species are common to both ponds. Species differences between these ponds might be because of water chemistry as suggested by Segers (2008).

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